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NOTE

First Report of Male Sleeping Aggregations in the Pollen Wasp *Celonites abbreviatus* (Villers, 1789) (Hymenoptera: Vespidae: Masarinae)

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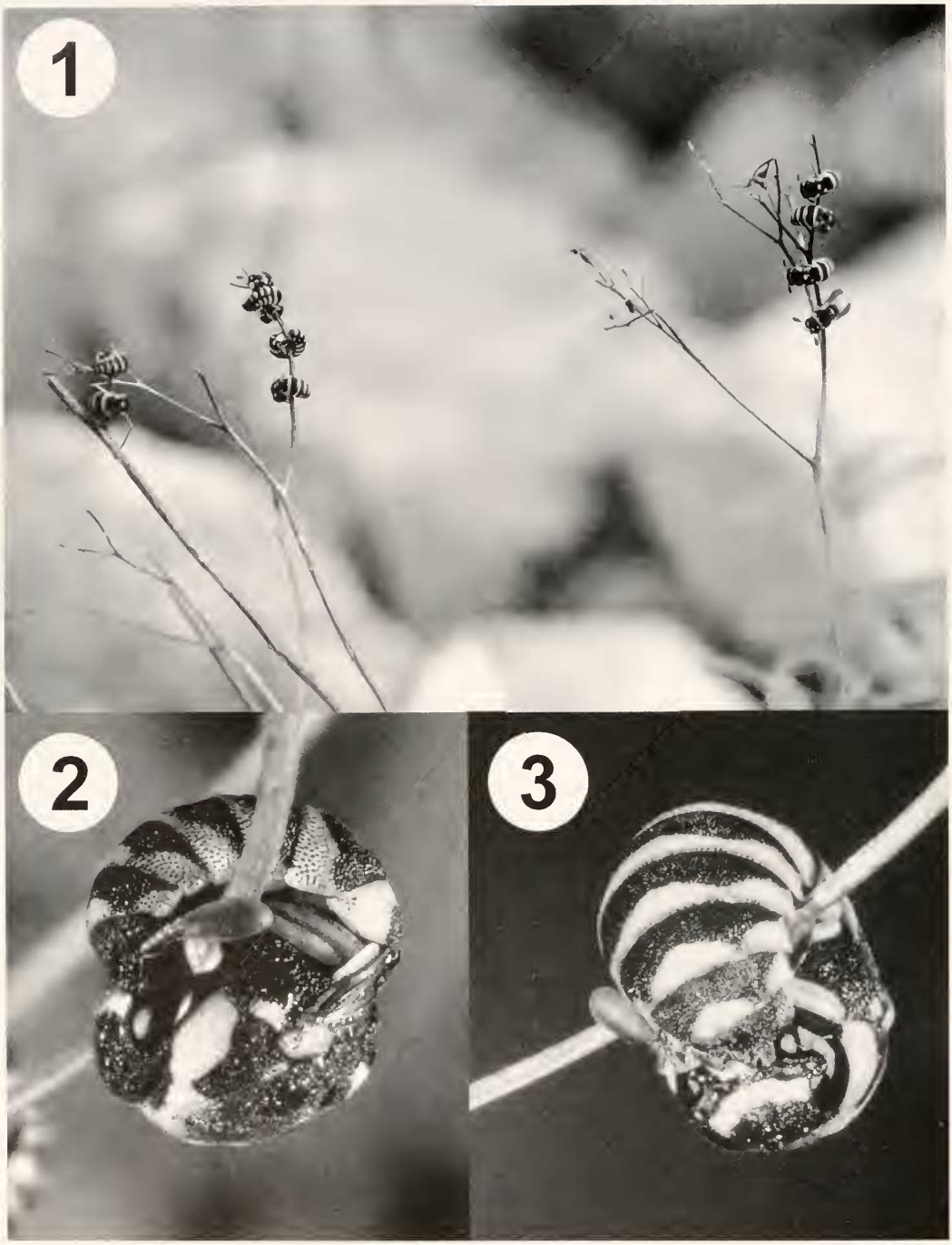
The nightly resting behaviour of solitary and social bees, and probably also of many other Aculeata, constitutes a sleep-like state with many neurophysiological parallels to mammalian sleep (Kaiser and Steiner-Kaiser 1983, Kaiser 1988, 1995). Sleeping behaviour has been well documented in many species of solitary wasps (O'Neill 2001: 294). Interspecific variation of sleep is evident in (1) the location of the sleeping site, (2) the postures adopted during sleep, and (3) whether the wasp sleeps in the company of other members of its own species, members of the opposite sex, and members of other species (O'Neill 2001: 294). In contrast, present knowledge of sleeping behaviour of male pollen wasps is poor. Males of some species of the genus *Ceramius* seek overnight shelter in conspecific nests that may or may not contain females (Brauns 1910, Gess 1996: 63, Mauss 1996). *Celonites andrei* Brauns was observed to spend the night sleeping on vegetation (Brauns 1910), and a male of *Celonites abbreviatus* slept curled up around a blade of grass (Bischoff 1927: Fig. 29). Males of *Masarina mixta* Richards were commonly observed to sleep in bell-shaped flowers of *Wahlenbergia* (Campanulaceae) on which they and the females forage during the daytime (Gess 1996: 63).

Male sleeping aggregations have not previously been recorded for any species of the Masarinae (Gess 1996: 63), although they have been observed for numerous other wasps and bees (summarised by Bischoff 1927: 62–64, Westrich 1989: 124, O'Neill 2001, Wcislo 2003). We describe here for the first time, male sleeping aggregations in *C. abbreviatus* which were discovered at two different locations in Switzerland.

(1) Pfynwald (07°35'E 46°38'N), Rhone Valley, Wallis, Switzerland, July 1977, obs. F. Amiet, A. Krebs: In the evening four males were sleeping in an aggregation on a withered, branched stem of an herbaceous perennial plant about 0.2 m above the ground. A photograph of this aggregation was reproduced in Witt (1998: 192 bottom right), however it was not further commented on, and it was erroneously shown in the vertical position. Distance between the males varied from 0 (i.e., in physical contact with each other) to about 8 mm. All males adopted the same typical posture: They curled their bodies around the stem so that the tip of their metasoma covered the ventral part of the clypeus. Antennae and legs were pulled up under the mesosoma, and the wings were folded underneath the metasoma (Figs. 2, 3, the identical posture as in Bischoff 1927, fig. 29). The males were observed to aggregate and sleep on the same stem on several consecutive nights.

(2) Berner Oberaland near Boltigen (07°22'E 46°38'N), Simmental, Switzer-



Figs. 1–3. *Celonites abbreviatus*, male sleeping aggregation. 1, Berner Oberaland, August 1997 (actual body length of males about 8 mm). 2, Sleeping posture (viewed from left), Pfynwald, July 1977 (Photo: A. Krebs). 3, Sleeping posture (viewed from ventral), Pfynwald, July 1977.

land, at the foot of a scree slope, August 1997, obs. F. Amiet: The sky was cloudy and whenever the sun became obscured by a larger cloud some males of *C. abbreviatus* alighted on two withered stems of herbaceous perennial plants about 0.25 m above the ground (Fig. 1) and adopted the typical sleeping posture. Moments later when the sun emerged again some of these males became active and flew away. From three o'clock p.m. (Central European Time) onward all the males remained in the sleeping posture on the stems although the sun still shined intermittently. At four o'clock p.m. it commenced to rain. A maximum of 14 males were observed on both stems. Distance between the sleeping males in the aggregation ranged from 0 to about 8 mm.

Other clades of the Vespidae in which male sleeping aggregations occur are the Euparagiinae (*Euparagia scutellaris* Cresson, Moore 1975) and at least six genera of the Eumeninae (*Labus*, Bischoff 1927: 62, and *Ancistrocerus*, *Eumenes*, *Pterocheilus*, *Rhynchium*, *Stenodynerus*, Linsley 1962). The sleeping postures of the eumenine wasps studied differ distinctly from that in *Celonites abbreviatus*: Males of the Eumeninae attach themselves to the substrate with their legs and mandibles (Linsley 1962). Their wings are folded but extend outward at an angle of approximately 45 degrees. Unfortunately, the sleeping posture of *Euparagia* cannot be brought into context since it was not described in sufficient detail by Moore (1975). The evolutionary significance of aggregated sleeping is uncertain (Evans et al. 1986), but it has been suggested that it offers protection against predators, may influence thermoregulation or may be associated with mating behaviour (cf. Freeman and Johnston 1978).

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